CLAIMS

I CLAIM AS MY INVENTION:

1. An integral thrust/journal bearing assembly comprising:

a journal bearing configured to operate at a first mechanical load, and a thrust bearing including a thrust bearing face, the thrust bearing configured to operate at a second mechanical load different than the first mechanical load; and

a fluid circuit comprising parallel branches within the integral bearing assembly for delivering parallel flows of lubricating fluid to the thrust bearing face and the journal bearing.

2. The integral bearing assembly of claim 1 wherein each parallel flow of lubricating fluid is selected to appropriately meet bearing cooling requirements in view of the different mechanical loads to which each bearing is subjected.

3. The integral assembly of claim 1 mountable in a bore defined by a casing, wherein the fluid circuit comprises at least one passageway in fluid communication with a fluid plenum in the casing.

4. The integral bearing assembly of claim 1 wherein the fluid circuit comprises at least one passageway in fluid communication with a fluid plenum built in the bearing assembly.

5. The integral bearing assembly of claim 4 wherein the fluid plenum comprises a groove extending along an outer diameter of the bearing assembly.

6. The integral bearing assembly of claim 5 wherein the bearing assembly comprises a passageway in fluid communication with the built-in fluid plenum for passing lubricating fluid from the fluid plenum to the thrust bearing face through at least one opening in said face.

7. The integral bearing assembly of claim 1 further comprising at least one array of channels on the thrust bearing face for distributing lubricating fluid over said face.

8. The integral bearing assembly of claim 7 wherein the array of channels comprises a spiral-like pattern.

9. The integral bearing assembly of claim 7 wherein the array of channel comprises a generally rectilinear pattern for directing lubricating fluid to a hot spot region on said face.

10. The integral bearing assembly claim 1 further comprising at least one array of channels on a bearing collar in correspondence with the thrust bearing face for distributing lubricating fluid over said face.

11. The integral bearing assembly of claim 10 wherein the array of channels comprises a spiral-like pattern.

12. The integral bearing assembly of claim 10 wherein the array of channel comprises a generally rectilinear pattern for directing lubricating fluid to a highly loaded region on said face.

13. The integral bearing assembly of claim 1 wherein the second mechanical load is higher relative to the first mechanical load and wherein the bearing assembly further comprises at least one fluid restrictor connected to divert a higher amount of lubricating fluid to the thrust bearing.

14. A turbocharger comprising:

a turbocharger casing;

a rotatable shaft supported by a bearing system comprising at least one journal bearing at opposite ends of the shaft, the bearing system further comprising at least one thrust bearing including a thrust bearing face; and

a fluid circuit comprising parallel branches for delivering parallel flows of lubricating fluid to the thrust bearing face and each journal bearing, each parallel flow of lubricating fluid selected to appropriately meet bearing cooling requirements in view of different mechanical loads to which each bearing may be subjected.

15. The turbocharger of claim 14 wherein the thrust bearing is mountable in a bore defined by the turbocharger casing, wherein the fluid circuit comprises at least one passageway in fluid communication with a fluid plenum in the turbocharger casing.

16. The turbocharger of claim 15 wherein the turbocharger casing defines at least one opening in fluid communication with the fluid plenum in the casing for passing lubricating fluid from the fluid plenum to the thrust bearing face through at least one opening in said face.

17. The turbocharger of claim 16 wherein the at least one opening in the turbocharger casing is in alignment with the at least one opening in the thrust bearing face.

18. The turbocharger of claim 14 wherein the fluid circuit comprises at least one passageway in fluid communication with a fluid plenum built in the thrust bearing.

19. The turbocharger of claim 18 wherein the fluid plenum comprises a groove extending along an outer diameter of the thrust bearing.

20. The turbocharger of claim 19 wherein the thrust bearing comprises a passageway in fluid communication with the built-in fluid plenum for passing lubricating fluid from the fluid plenum to the thrust bearing face through at least one opening in said face.

21. The turbocharger of claim 14 comprising at least one array of channels for distributing lubricating fluid over the thrust bearing face, the array disposed on at least one of the following structures: a bearing collar in correspondence with the thrust bearing face, and the thrust bearing face.

22. The turbocharger of claim 21 wherein the array of channels comprises a spiral-like pattern.

23. The turbocharger of claim 21 wherein the array of channel comprises a generally rectilinear pattern for directing lubricating fluid to a region of said face comprising a hot spot.

24. The turbocharger of claim 14 wherein the mechanical load of the thrust bearing is higher relative to the mechanical load of each journal bearing and further comprising at least one fluid restrictor connected to divert a higher amount of lubricating fluid to the thrust bearing.

25. A method for retrofitting an integral thrust/journal bearing assembly, the bearing assembly including a first path within the assembly for delivering lubricating fluid to a journal bearing, the method comprising:

modifying the integral thrust/journal bearing assembly by providing a second path within the integral bearing assembly in parallel with the first path to deliver lubricating fluid to the thrust bearing.

26. The method of claim 25 further comprising restricting a flow of lubricating fluid in the first path to divert a higher flow of lubricating fluid through the second path to the thrust bearing.